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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/995,200	11/26/2001	Yu-Chiang Cheng	8688.251US01	9398
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MERCHANT & GOULD P.C. P.O. Box 2903 Minneapolis, MN 55402-0903		EXAMINER PATEL, ISHWARBHAI B		
		ART UNIT 2827		
		PAPER NUMBER		

DATE MAILED: 02/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/995,200

Applicant(s)

CHENG, YU-CHIANG

Examiner

Ishwar (I. B.) Patel

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 November 2003.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-34 is/are pending in the application.  
4a) Of the above claim(s) 7-26 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-6 and 27-34 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 26 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4 and 27-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snodgrass et al., US Patent No. 5,311,406, hereafter, Snodgrass.

Regarding claim 1, Snodgrass discloses a multi-layer circuit board comprising:

at least two metal layers and at least two signal wiring layers disposed one above the other, at least one of said metal layers being a ground metal layer, at least one of said metal layers being a power metal layer (signal layers 10 and 240, any two of the other layers, 30 to 230, include ground / power layer, column 4, see figure 4, column 4, line 40-62); and

a plurality of insulating substrates disposed sequentially one above the other, each adjacent pair of said metal layers and said signal wiring layers being spaced apart by one of said insulating substrates; wherein at least one of said signal wiring layers

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is suitable for high-speed low-impedance signal transmission (dielectric sheets 20, 40, etc., adjacent to metal layers 10, 30, 50 etc., and signal layer 10 configured to form high frequency circuit, see figure 4, column 4, line 40-60),

said at least one of said signal wiring layers that is suitable for high-speed low-impedance signal transmission being separated from the adjacent one of said metal layers by an adjacent one of said insulating substrates, which is made from a first insulator material having a first dielectric coefficient; the other ones of said insulating substrates that are not adjacent to said at least one of said signal wiring layers being made of a second insulator material having a second dielectric coefficient that is lower than the first dielectric coefficient (dielectric sheet 20 made of PTFE material has higher dielectric coefficient than that of 40 made of fiberglass material, see figure 3-4, column 4, line 40-62 and column 3, line 10-25), but

fails to explicitly disclosing the signal layer, metal layer 10, has a resistance relative to an adjacent one of said metal layers within the range of 25.2 to 30.8 ohms.

However, the crux of the invention of Snodgrass is to have the insulating substrate adjacent the signal layer with higher dielectric constant than the one which is away from the signal layer with the other metal layer in-between, and the dielectric constant of sheet with PTFE can be adjusted within the required range, column 1, line 36-45.

It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

A person of ordinary skill in the art at the time the invention was made would adjust the dielectric constant to have low power loss during the high frequency transmission with the desired resistance value.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Snodgrass with the signal layer, metal layer 10, with a resistance relative to an adjacent one of said metal layers within the range of 25.2 to 30.8 ohms, apparently to have the desired functionality of the high frequency circuitry with low power loss.

Regarding claim 2, Snodgrass further discloses the second dielectric coefficient is about 4.5, (fiber glass has a dielectric constant about 4.0, see column 1, line 30-35).

Regarding claim 3, Snodgrass further discloses the first dielectric material as PTFE with coefficient adjustable between 2 to 11, which covers the range, see column 1, line 40-45).

Regarding claim 4, Snodgrass further discloses the second insulator material is glass fiber reinforced epoxy resin (fiber glass layer).

Regarding claim 27-34, the applicant is claiming fifteen insulating layers with corresponding metal layer and various location of the first and second insulating material for the insulating layers.

Though, Snodgrass does not disclose the specific arrangement of the metal layers and the dielectric layers, the invention of Snodgrass is to have the combination of insulating material with different dielectric coefficient and their arrangement with respect to the metal layers to have better performance of high frequency circuitry with low power loss.

Further, Snodgrass discloses layers 40 through 240, are alternating metallic sheet and dielectric sheets of predetermined thickness of predetermined dielectric materials, some of which can include PTFE and material dissimilar from PTFE, along with external metal layer 250 and predetermine internal metallic layers used for strip line, see Snodgrass, figure 4, column 4, line 41-63.

It has been held that mere duplication of the essential parts of a device or rearranging parts of an invention involves only routing skill in the art, *In re Japikse*, 86 USPQ 70 and *St. Regis Paper Co. v. Bemis Co.* 193 USPQ 8.

A person of ordinary skill in the art at the time the invention was made would arrange the insulating and metal layers in the board to have the desired functionality with low power loss.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Snodgrass with fifteen insulating layers with corresponding metal layers and various location of the first and second insulating material for the insulating layers, as claimed in claims 27-34, in order to have a circuit board for the desired functionality of high frequency transmission with low power loss.

3. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snodgrass, as applied to claims 1-3 above, and further in view of Arthur et al., US Patent No. Re36396, hereafter Arthur.

Regarding claim 5, Snodgrass discloses all the features of the claimed invention as applied to claims 1-4 above, but

fails to explicitly disclose the ceramic filled polytetrafluoroethylene.

Snodgrass discloses polytetrafluoroethylene without any further detail, however further discloses the dielectric constant or polytetrafluoroethylene can be changed depending upon the requirement.

Arthur discloses ceramic filled polytetrafluoroethylene for improved electrical performance.

It has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

A person of ordinary skill in the art at the time the invention was made would use the known material to have the board for high frequency transmission with low power loss.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Snodgrass with ceramic filled polytetrafluoroethylene, from the teachings of Arthur, in order to have the desired dielectric constant for the better functioning of the high frequency circuitry with low power loss.

Regarding claim 6, the combination of Snodgrass and Arthur discloses a ceramic filled polytetrafluoroethylene to have dissipation factor as low as 0.002 (Arthur, column 11, line 55-67).

### ***Response to Arguments***

4. Applicant's arguments filed on November 20, 2003 have been fully considered but they are not persuasive. Applicant argues that:

(a) "Snodgrass et al. is relied upon to suggest a board constructed of two dissimilar materials (PTFE and fiberglass) so as to have reduced flexibility, thereby eliminating solder joint failures and increasing board reliability".

This is a structural claim and Snodgrass discloses the claimed structure. Further, Snodgrass does disclose the use of the board for high frequency transmission.



(b) "Snodgrass et al. does not discloses the specific arrangement of the insulating substrates and signal wiring layers of the present invention" and "The present invention, by virtue of the unique construction of the circuit board, can achieve low resistance for high-speed low impedance signal transmission without increasing the width of traces of the wiring boards, thereby minimizing signal interference".

The independent claim 1, discloses at least two metal layers and at least two signal wiring layers, but does not discloses any specific arrangement except an insulting layer near the signal layer, in the pair of signal wiring layer and metal wiring layer, has higher dielectric coefficient than that of the nearest second insulating layer, which is separated by the metal layer.

The same structure is disclosed by figure 3 and 4 of Snodgrass, layer 10, a signal layer, layer 20, a ceramic/PTFE layer with high dielectric coefficient, layer 30, a metal layer and layer 40, a fiber glass layer, with low dielectric coefficient than that of the layer 20.

### ***Conclusion***

**5. THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (571) 272 1933. The examiner can normally be reached on M-F (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272 1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ibp  
February 3, 2004.

  
CARL WHITEHEAD, JR.  
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